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CONTENTS

FISH MARKETING IN WESTERN EUROPE 3

FISH CULTURE AS A MEANS OF CONTROLLING AQUATIC WEEDS IN INLAND WATERS 15

FISHERIES DIVISION ACTIVITIES 25

NOTES ON FILMS 30

NOTES ON PUBLICATIONS 32

Editor: D. B. Finn

Assistant Editor: Anna Mae Singer Jul

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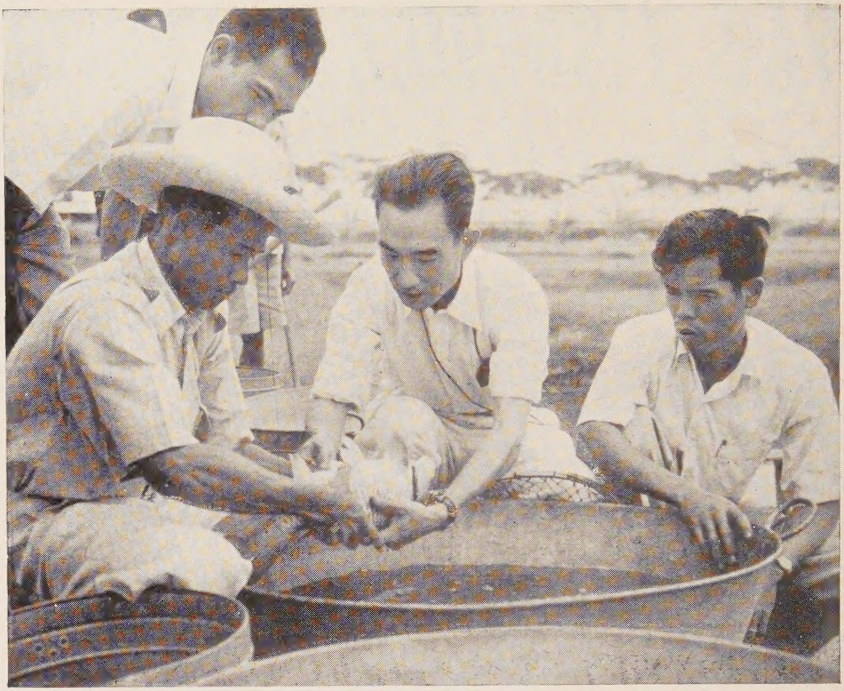

Figure 1. An FAO technical assistance expert works with local fisheries officers in Thailand in the selection of carp for breeding.

Figure 2. Fishing a pond in Indonesia. FAO will conduct a fish culture seminar in Djakarta from 1 May to 15 June, 1952.

FISH MARKETING IN WESTERN EUROPE

Review of a Report on Fish Marketing published by the Organization for European Economic Co-operation.

European fish landings in 1949 amounted to some 5.8 million metric tons. The largest part of this output (4.8 million metric tons) was landed in member countries of the Organization for European Economic Co-operation (OEEC) which account for some 20 percent of the total world fish production.

While the catching of fish was restored fairly rapidly after the wartime destruction of facilities marketing became progressively more difficult and, early in 1950, the Fisheries Sub-Committee of OEEC suggested that a survey be undertaken on fish marketing and consumption in member countries.

In June 1950, it was decided that such a survey would be made. This survey was carried out by five experts nominated by member countries. Two members of the FAO Secretariat assisted them and prepared the report for publication.

During their work, the experts were guided by a steering group appointed by the Fisheries Sub-Committee and meetings with them were held on several occasions.

According to instructions drafted by the Sub-Committee, the survey[1] "... should concentrate on the factors limiting the consumption of fish in Europe and the means by which such consumption may be increased. It should provide an appraisal of all the factors, national and international, which will have to be taken into account in developing markets in Europe and possibly elsewhere. Generalization should be avoided. The approach should not be academic, but rather that of a commercial firm investigating the possibility of increasing its sales..."

Only five months - September 1950 to January 1951 - were allowed for the survey. In order to cope with immediate and pressing problems the time had to be short, making the work more difficult, as visits had to be made to many countries to gather the necessary information on the spot before writing as homogeneous a report as possible.

The present article does not pretend to give a complete summary of the report but to show some of the principal points brought out in it and to comment on the steps which might be taken to improve the situation.

I. The Facts

(a) Production

Most European countries have made serious efforts to increase their fish production so that current production in many countries is

[1]Organization for European Economic Co-operation, *Fish Marketing in OEEC Countries*. Paris, 1951. 247 pp.

greater than prewar. Table 1 shows statistics of fish landings in European countries in 1938 and 1946-1950.[2]

TABLE 1. — EUROPE : FISH LANDINGS BY COUNTRY, 1933 AND 1946-1950[1]

Country	1938	1946	1947	1948	1949	1950
	Metric tons					
Albania	3 300	*2 000	*2 000	*2 500	*3 000	*3 000
Austria	*2 000	—	100	*300	*1 500	1 300
Belgium	42 800	74 000	81 200	70 900	68 300	60 400
Bulgaria	*4 000	*4 000	*4 000	*4 000	*4 000	*4 000
Czechoslovakia	*3 000	*3 000	3 500	*3 500	*3 500	*3 500
Denmark	106 000	201 400	212 400	225 800	255 000	251 200
Faroe Islands	*30 000	*40 000	*50 000	*60 000	*110 000	*115 000
Finland	22 400	49 100	46 100	46 100	65 700	65 800
France[2]	479 400	289 400	352 200	434 600	435 100	432 000
Germany (Federal Republic)	787 300	264 500	302 100	413 400	513 600	564 900
Germany (Soviet Zone)[3]	49 200	*50 000	*50 000	*50 000	*50 000	*50 000
Greece	25 000	*15 000	*22 000	33 600	35 000	*35 000
Hungary	7 000	2 000	2 000	4 000	*4 000	*4 000
Iceland	274 300	368 200	477 200	464 700	394 200	366 000
Ireland	12 700	22 400	21 500	25 900	18 200	15 100
Italy	195 200	160 200	182 000	170 300	180 000	190 200
Malta and Gozo	1 100	*1 000	*1 000	*1 000	*1 000	*1 000
Netherlands	235 800	190 400	247 300	269 400	235 800	229 400
Norway	1 139 200	971 900	1 187 800	1 386 500	1 165 700	1 349 300
Poland[4]	12 500	23 300	39 500	48 200	57 600	*60 000
Portugal	240 600	306 000	280 500	273 800	282 500	301 000
Rumania	*30 000	*30 000	*30 000	*30 000	*30 000	*30 000
Spain	299 100	594 300	572 400	534 200	551 000	600 000
Sweden	143 500	183 700	178 800	207 800	202 200	197 600
Switzerland	*2 000	*2 000	*2 000	*2 000	*2 000	*2 000
Trieste	*4 000	*3 000	3 800	4 700	4 700	2 600
United Kingdom[5]	1 197 400	1 035 800	1 142 600	1 199 700	1 156 400	988 300
Yugoslavia	13 300	*15 000	*16 000	*18 000	*20 000	28 700
Others[6]	*500	*500	*500	*500	*500	*500
Total	**5 362 600**	**4 902 100**	**5 510 500**	**5 985 400**	**5 850 500**	**5 951 800**

Note : This table is limited to those countries within the geographical boundaries of the continent of Europe. In general the information has been obtained from official publications and communications with official agencies in the countries concerned. FAO estimates are indicated by an asterisk (*).

Data for the following inland countries is unavailable and their fish output, if any, is considered insignificant : Andorra, Liechtenstein, Luxemburg, San Marino ; no data are available for Gibraltar. For Monaco see footnote[2] below.

The Channel Islands and the Isle of Man are included with the United Kingdom ; Svalbard with Norway, and the Dodecanese Islands with Greece.

Turkey has not been included since it is listed under Asia in *Nomenclature of Geographic Areas for Statistical Purposes*, Series M, N°. 1, Statistical Office of the United Nations, Lake Success, N. Y., 1 January 1949. Landings in Turkey have been estimated at about 115,000 metric tons in 1938 ; during postwar years a downward trend may make landings less than 100,000 metric tons annually.

[1]Round fresh weight unless otherwise indicated.

[2]The figures for 1938 and 1946-47 contain an estimated quantity of crustaceans and mollusks. Data for France include landings in Monaco.

[3]Data for 1938 were obtained by subtracting landings in West German ports from the total landings ; data for other years were estimated on the basis of the 1938 figures.

[4]Reported weight.

[5]Does not include Isle of Man for 1949 and 1950. Figures for Northern Ireland, which are included, are 3,800 metric tons for 1938 and (estimated) 4,000 metric tons annually 1946-50.

[6]See general note above.

Considering percentages, countries like Denmark, Faroe Islands, Spain and Yugoslavia, had an output in 1950 many times larger than their prewar one. Considering quantities only, the Norwegian situation is worth mentioning as its production in 1950 was more than 200,000

[2]A similar table is attached to the OEEC Report but the present one includes some later revisions made.

metric tons higher than in 1939. This increased production is the result of many factors. Many of the fishing fleets which emerged from the postwar period have a greater number of large craft. Their range of action is broader owing to the wider use of internal combustion engines. New navigation aids and, in some countries, new types of fishing gear, have also contributed towards increasing the efficiency of the unit.

This development in the fisheries industries of countries affected by the war was stimulated by governmental action to facilitate reconstruction either by taking charge of it entirely or by providing subsidies or necessary credits. Other measures, such as favorable social security schemes for fishermen, credit facilities for the construction of fishing boats and the exemption of taxes on fuel, were also generally adopted and improved the situation of the industry. Many countries used more direct methods, such as protective external trade measures, which will be considered at a later stage. Even though it is quite exceptional, the system of direct subsidies, such as the one to which the United Kingdom had recourse, should also be noted.

The increased production had already been a matter of concern for the OEEC Fisheries Sub-Committee, and when it met in July 1949, the " surplus " threat was one of the main topics discussed. By " surplus, " the Sub-Committee meant the quantities which could not be sold at prices acceptable to the producer ; this quantity was estimated at some 500,000 metric tons for OEEC countries. In its report, the Sub-Committee stated that the only solution of this problem that could be seen was " ... to produce as much salted and dried fish as markets can absorb and, at the same time, to make all efforts to market as much as possible in other forms . . . "

The findings of the experts confirmed the Committee's fears concerning fresh fish : " Plans to expand fishing were often based on an optimistic view of the market possibilities ; in spite of the general drop in prices, the year 1950 brought considerable reduction in the fresh fish trade between countries.[3]

It was made clear that the herring trade had also encountered some difficulty ; exports of fresh herring as well as the quantities salted were reduced and fishing was stopped for periods of various lengths when the processing capacity for oil and meal production was insufficient to cope with the landings.

It was felt that frozen fish should play a more important role in the European market. The development of frozen fish, although considerable since World War II, was hampered by unfortunate experiences regarding quality.

The total European salted cod production was very much reduced during World War II. Serious efforts were made to restore it to its prewar level ; the 1947 production was equal to that of 1938, while the 1950 production was some 40,000 metric tons above the 1938 level. Exports had been resumed with success but some obstacles, mainly due to prices or currency difficulties, were met and the experts thought that the market approached saturation.

[3]ibid. p. 22.

Stockfish was still in short supply, but an expansion of production was underway.

Salted herring production had not recovered its prewar importance, partly due to a falling-off in consumption in Europe. The FAO Herring Meeting, held at The Hague in 1949, had already mentioned a decline in the demand for salted herring " . . . while the consumer is displaying more interest in soft cure . . . "

(*b*) TRADE

The over-all impression given by the OEEC Report is that there is little to criticize in the wholesale or semi-wholesale trade. Relations between coastal and inland wholesalers were discussed in many countries and valid arguments for the existence of each seem to be present ; the experts felt that " ... the balance between coastal and inland wholesale trade can only be adjusted through competition between the two . . . "

The retail trade, on the other hand, was criticized : " ... Generally speaking, it was apparent to us that the retail trade could be improved... " Similar statements can be found in most of the chapters concerning individual countries. Fish retailing requires highly qualified personnel but it was found that the professional knowledge of the fish retailers was very uneven. The physical installations were often inadequate and did not allow the proper storing and display of fish. In many places, the number of shops was insufficient. The experts impression was that " ... if the consumers became aware of the possibilities which exist for presenting the fish to them under better conditions, they would object more strongly to the present way in which fish is still being sold in so many places... "

Part of the fish caught by European countries enters international trade, as indicated in the following table (marketed weight) :

TABLE 2 - EUROPEAN FISH PRODUCTION ENTERING INTERNATIONAL TRADE

Year	Fresh and Frozen	Salted, Dried or Smoked	Canned	Crustaceans and Mollusks
	Metric tons			
1938	339 189	466 331	76 425	58 281
1948	508 837	340 902	90 289	54 062
1949	543 877	310 260	78 603	60 926
1950	324 789	271 543	89 921	54 680

While most of the OEEC member countries produce much of the fish they consume, some countries can be classed as " primarily exporting countries. " However, with the exception of Iceland, the home market remains the most important of all the individual markets open to them.

The OEEC experts made an attempt to determine the principal channels of international fish trade in western Europe and found : " . . . The main lines of international fisheries trade in western Europe

are :

(1) fresh fish exchanged between North Sea countries, particularly from the Scandinavian countries (including Iceland), to the United Kingdom, to Germany and other countries o the continent ;

(2) salted cod and stockfish from Scandinavia and smoked herring from the United Kingdom, to the Mediterranean countries ;

(3) salted herring, mainly from the United Kingdom, the Netherlands, and Scandinavia, mainly to eastern European markets ;

(4) salted cod from Scandinavia to South and Central America, and canned fish mainly from Portugal and Scandinavia to all regions of the world." [4]

Up to now, bilateral trade agreements have been the basis of this international trade ; this setting is somewhat rigid and does not always fit easily into unusual situations. Furthermore, import restrictions, consisting of direct means such as high import duties very often hamper international trade.

One of the aims of OEEC was to improve this situation by promoting the "liberalization" of trade among European countries. Some attempts have been made in the fisheries field but "... in many cases, fish liberalization was killed shortly after its conception ... "

(c) Consumption

The records of the experts, complemented when necessary by their estimates, have made possible the drafting of the following table :

TABLE 3 — ESTIMATED CONSUMPTION OF FISH IN SOME EUROPEAN COUNTRIES[1] - 1949

Country	Total Quantity[2]	Total Population[5]	Per Head Annually
	(*Metric tons*)	(*Thousands*)	(*Kilograms*)
Austria	20 900	7 100	2.9
Belgium	70 617	8 660	8.2
Denmark	66 500	4 290	15.5
France	325 700	40 000	8.1
Germany (Federal Republic)	815 000	50 700	16.1
Greece	103 000	7 970	13.0
Iceland[3]	7 000	143	50.0
Ireland	15 000	3 000	5.0
Italy	350 000	46 400	7.5
Luxemburg[4]	1 300	300	4.4
Netherlands	87 000	10 150	8.6
Norway	175 000	3 280	53.4
Portugal	390 200	8 670	45.0
Sweden	140 000	7 050	20.0
Switzerland	8 900	4 700	1.9
Trieste	2 000	300	6.7
Turkey	55 000	20 000	2.7
United Kingdom	1 200 000	50 800	23.7
	3 833 117	**273 513**	**14.0**

[1]Includes fresh, frozen, salted, dried, marinated, and other similarly processed fish ; excludes mollusks, crustaceans and canned fish.
[2]Round fresh weight.
[3]Estimated on the basis of an average of 50.0 kg. per person, per annum.
[4]Average for Belgium is used in lieu of other information.
[5]Latest estimates.

[4]ibid p. 20.

Such averages give only a rough idea of the consumption level as very large differences exist in each country, large centers and coastal zones being always great consumers while in rural regions consumption is smaller or sometimes non-existent.

It was impossible for the experts to draw general conclusions concerning the species preferred by European consumers ; preferences varied very much from one country to another, from one region to another, and sometimes, with the passing of time in a given country. It seems rather difficult to point out the cause of such differences or evolutions. The experts found that there was a general and " . . . growing desire to buy fish in a form which is easy to prepare ..." therefore more and more fish is being sold filleted.

With few exceptions, such as the Swiss market, frozen fish is not generally well accepted.

Owing to the basic importance of landing prices, the OEEC experts paid special attention to prices and considered that the following factors exerted the main influence :

(*i*) factors determined by " nature, " such as " . . . distances to fishing grounds, average yield, and working conditions at the grounds . . . ; "

(*ii*) technical, social and economic factors particular to each country (the *national* factors), and

(*iii*) the *international* factors, such as import restrictions, currency regulations, which directly influence international trade.

The influence of each group of factors varies much from one country to another, and governmental intervention, which is nil in the first group, is important in the second and still more important in the third.

The control of prices, which was a rule just after the war, is now an exception. However, in some countries, price control, either by direct government action or through trade organizations, was noticed. For instance, in Portugal, which is mainly an importing country, price control is limited to the domestic market whereas in Norway, where exports play an important role, such controls center on the export trade.

While wholesale prices compared to landing prices leave little room for complaint, the OEEC Report mentions that retail prices often reach too high a level following the application of too high margins. During the course of the survey it was also observed that, while one of the purposes of the retailers was to even out prices, they often failed in that task ; retail prices varied from day to day ; rises in landing prices were rapidly reflected, while adjustment in the event of a fall in landing prices was very slow.

The present price level alone does not explain the consumers' prejudice against fish, but is certainly a factor of prime importance. Even where the price of fish compares favorably, weight by weight,

with the price of meat in many countries, in most cases the comparison becomes unfavorable if the cost of preparation and cooking ingredients are taken into consideration, especially if it is kept in mind that the average consumer needs an amount of fish larger than the amount of his normal meat ration to satisfy his appetite.

(e) Quality

After having indicated that the word "quality" was "... used in connection with the extent to which a given commodity comes up to the ideal condition...," the experts state that they have come to "...the conclusion that lack of sufficiently good quality is possibly the most important factor hampering fish consumption in Europe...," and that "...at least 50% - maybe 70% - of the total quantity is more than two weeks old..." When it is remembered that the cooling facilities, handling, storage and transport in most cases is not perfect, this lapse of time makes it clear that the major part of the fresh fish is marketed in a very poor condition.

Countries where coastal fisheries are dominant are, of course, at the initial stage, in a better position, but the lack of professional education and inadequate facilities for transport and sale sometimes cause fish to reach the consumer in a poor condition.

It is worth mentioning that the main achievement towards improvement of the quality is to be found in the exporting countries. Denmark is probably the best example ; the high standard of Danish fish is probably one of the main factors which enabled this country to find an outlet on external markets for its increased production. Education of the fishermen and exporters, proper transport equipment and governmental control are some of the means by which this has been achieved.

For frozen fish, it seems that the low quality level of some products put on the market during and after the war is the direct cause of the disrepute into which this product has fallen in Europe. Furthermore, the present lack of equipment for storage and sale result in what was originally good frozen fish being found in very poor condition in many fish shops and markets.

Comparatively speaking, the quality level for salted cod was found to be much higher, mostly due to the great experience of Europeans in the technique of its preparation and to the fact that it is easy to keep. However, improvements could be achieved in some countries by making better use of cold storage facilities.

For salted herring, the expert thought that the somewhat poor quality of quantities marketed during the postwar period of food emergency resulted in the low consumption observed.

(f) Transport

The lack of adequate transport facilities, already mentioned under "quality," was recorded many times by the experts. Although in most

cases large centers are well serviced by transport, in rural regions this is not so. This adversely affects fish consumption and in some cases makes it impossible.

In some countries, e. g. the United Kingdom or France, the experts found that the transport policies of the governments, restrained shippers in their choice of transport thus, in some cases, preventing the transport of fish in the shortest time or at the most favorable rate.

However, the OEEC experts did not notice that the cost of transport was an obstacle to fish consumption.

(*g*) Propaganda

Several countries have already initiated propaganda campaigns, either limited to their own countries or directed towards their export markets. At the writing of the Report, propaganda for the domestic market seemed to be best organized in Germany while Denmark and Norway could be cited as examples of good publicity for promoting fish consumption in foreign markets.

It is beyond doubt that propaganda is one means of bringing about a sizeable increase in fish consumption, but this result can only be achieved if other conditions,, such as price, quality, etc, are also favorable.

II. Remedies

Apparently, in the postwar period, most European countries reconstructed and developed their fishing fleet and gave only little attention to the need for corresponding outlets for increased supply. This expansion of the fleets took place at a period when there was still a scarcity of food but, very soon, the threat of surpluses appeared. At present, countries seem to have a clearer view of the situation and it is well understood that any future development of the European fishing fleet towards increased production would be dangerous if not matched by an increase in the consumption of fish. The reconstruction of the fishing craft destroyed during the war is now completed and the special financial schemes set up for this purpose have now disappeared. Moreover, the financial difficulties experienced by a number of countries render it difficult to grant credits at preferential rates for the construction of fishing craft needed for the normal replacement of old units. Market conditions no longer being favorable, added to the difficulty encountered in disposing of the production, have resulted in a tendency to stabilize current production. Such stabilization may give some relief to the general situation of the fishing industry but it should not be considered as a remedy in itself.

The report of Commission II of the Sixth Session of the Conference of FAO, held in Rome, November-December 1951, states : "...World fish production today is estimated at approximately 25,000,000 metric tons and experts are satisfied that the fisheries resources are such that

this figure could be doubled without risk to their future ; a production and distribution of 50,000,000 approaches the level which nutritionists indicate desirable..."

This statement applies, of course, to certain countries in Europe where the consumption of fish is low. Some of the European seas probably are not in a position to bear more intense exploitation but other grounds, heretofore insufficiently fished, could supply the complement needed.

The present tendency to stabilize fish production is not likely to secure the future prosperity of the European fishing industry and better nutrition of the European peoples. A general increase of fish consumption would, on the contrary, secure both. It may be of interest to quote, in this connection, that the OEEC experts have summarized the main factors hampering fish consumption in Europe as follows :

"(1) About one-half of the total quantity of whitefish which is offered to consumers in western Europe as fresh fish is more than 15 days old and does not comply with requirements for good quality.

"(2) Although freezing (more than the present system of cooling) frequently offers greater possibilities for preserving the freshness of fish, consumers in most European countries have little taste for frozen fish products. This situation is due to unfortunate experience in the past, when the quality of frozen products presented to the consumer has too often been of a low standard because technical possibilities of freezing have manifestly not yet been fully utilized.

"(3) Among the deterrents to consumption in many countries are the wide fluctuations in prices and the present price level of certain kinds of fish. Where other food commodities, which compete with fish, are subsidized, a high price level for fish is often hampering sales.

"(4) Services rendered by the distributive trade, particularly in retail, leave much to be desired. There is too often a lack of initiative, reflecting also lack of interest in marketing questions among fish producers. Further, the equipment of the retail stores is on the average rather poor.

"(5) With due regard to the services rendered by retailers, margins at this stage are in many cases too high. The benefit of sharp falls in prices at ports does not always pass to the consumer.

"(6) It must be said that there is a lack of vocational training among the people employed in the fisheries industries and trade.

"(7) In purchasing most food products, consumers can choose the varieties they prefer, but in the fish trade they very often have to take what is offered. Also abundance in seasonal supplies may have a tedious effect on the consumer.

"(8) Import regulations often prevent the consumers from obtaining the quantities and varieties they want for the prices they can afford."[5]

Quality is probably one of the main points on which attention must be focused, and the problem must be tackled at every stage of the industry.

[5]ibid. p. 41.

In many cases, good examples of improved equipment exist, but they are still too few and need to be generalized. In the matter of mechanical refrigeration of fish holds, some countries, especially northern ones, have already made considerable investments. This development, however, is only in its initial stage but gives a valuable source of information which may help shipowners of all countries in improving refrigeration of their catches, especially for those fishing in southern waters. Other improvements in handling fish aboard, such as more adequate pounds or the use of boxes, are already adopted in some regions and might be introduced with success elsewhere.

Landing facilities and harbor equipment in many European countries do not permit the handling of fish in a proper way. But, here again, achievements have already been made or are underway in countries, such as Germany, which could serve as a model for countries wanting to improve their equipment.

With regard to road transport, the Danes have already built up an important fleet of refrigerated trucks and all problems related to those vehicles have been thoroughly studied and most of them solved.

In the matter of fish shops, the OEEC experts noted that they have seen "...some excellent retail shops where modern equipment for display and storing was available... However, in the same localities, we found retail stores which are likely to bring the whole trade into disrepute..."[6]

As regards frozen fish, it may be that a good example is more difficult to find in Europe, but it is quite easy to learn from North America what can be done in this field. The use of better equipment is unlikely to be hampered by the lack of engineers or specialists. Most European countries have them already. If not, the Expanded Technical Assistance Program (ETAP) of FAO may enable them to obtain experts from abroad and to give their own people the necessary education through scholarships and fellowships.

Improvement of equipment is not, of course, sufficient to get better quality fish ; it would be just a waste of money if it were not accompanied by better professional training of all the participants in the fisheries industry.

Again, a quotation of the OEEC Report will make the point clearer: "...We are somewhat perturbed by the way in which fish was being unloaded by the trawlers. On discharging the cargo, hooks are used when the fish is sorted as it is placed in boxes for auction... the effect shows up later during transport and distribution..."[7] This is extracted from the chapter on Germany, mentioned in a previous paragraph as having achieved good landing installations ; it is obvious that the wrong handling technique may to some extent delete part of the gain resulting from the installation of proper equipment. The example of the use of hooks is not, of course, special to any one country, and other reprehensible practices could be found, mainly on the point of insufficient cleanliness. Some countries have already enforced regula-

[6]ibid. p. 27.
[7]ibid. p. 93.

tions forbidding such practices. Similar measures could be generalized, but good vocational training would be necessary to bring about a substantial improvement as "... many of the mistakes made are merely due to ignorance of the main factors influencing quality..." say the experts.

Education services should be available to all persons handling fish. Fishermen, of course, would benefit greatly from it, but it would be of still greater assistance to the retailers who often lack professional knowledge. It would help them not only to sell a better quality product but also would lead them to "...more initiative and greater care in presenting the product to the consumer..." thus leading to increased consumption of fish.

Excellent examples of professional training can be found in Germany and the Netherlands where schools have been opened for fish retailers. Similar measures might probably be taken by other countries, either through the initiative of the state or of trade groups.

The Expanded Technical Assistance Program of FAO might perhaps allow the creation of such schools on an international level for the training of professionals who might be able to act later as guides in their own countries. The creation of such international centers would also have advantage of facilitating the exchange of views and to familiarize the representatives of various countries with commercial methods and techniques in use elsewhere.

Improvement of the technical knowledge of retailers would be insufficient if it were not accompanied by improvements in the installations of the stores ; the equipment of pilot stores showing recommended installations might be one way of encouraging dealers to improve their physical facilities. The experience of Portugal in this field might serve as a model. Financial assistance may be necessary in some countries and a credit scheme comparable to the one adopted in Germany for fried fish shops might enable qualified dealers to open or to modernize shops.

Prices were also considered an important factor in fish consumption. The price control system seems to be less and less used and the general economic tendency probably would make its revival difficult at present. The price problem could be tackled in many other ways which might prove to be better adapted to real circumstances. Technical developments aimed primarily at improving the quality of fish, such as better transport or adequate storage facilities, might contribute at the same time to a reduction of prices. Professional education of retailers would teach them that moderate margins and a big turnover lead to a more prosperous business than the "high margin — little turnover" trade too frequently found at present.

The sale of fish at constant prices could lead also to greater consumption. In some countries, trade groups have already been established and have been able to supply fish at a standard price either for one fishing season or for a determined period, thus granting a great deal of security to the producers and allowing the disposal of the production under the best conditions possible. The establishment of pilot stores

selling at uniform prices throughout the year, such as those created in Portugal, is also a good method of advocating price stabilization.

The extension of the market for frozen fish could also indirectly help to stabilize fish prices. International agreements on furnishing supplies to fishing boats and landing their cargo at a place as near as possible to the fishing grounds might also be considered and would permit a great reduction in production costs.

It has been made clear by the OEEC experts that often people do not eat fish because either no fish is available, or the particular species desired is not on the market. This situation could be improved by better transport facilities or by the use of mobile shops. More initiative on behalf of retailers would be necessary in some cases; some retailers, for instance, sell fish only once a week or only in winter so that they may have fewer risks.

The problem is also connected with the question of fish imports. In many countries, fish retailers can offer the varieties of fish wanted by the consumer only if these species are obtained through imports. International trade is often hampered by customs' barriers, quotas, and other restrictive measures and the movement of fish from country to country is generally difficult and sometimes quite impossible. The complexity of economic relations, the internal structure of each country, and the peculiar characteristics of fisheries products are some of the elements which make the formulation of a general plan of reform rather difficult.

OEEC has already considered these problems, but the "liberalization" measures possible in fisheries matters are limited and only very slow progress along these lines can be foreseen for the time being; hasty or radical measures would cause many inconveniences and could lead to a result opposite from the desired one.

The adoption of foreign trade regulations permitting a reasonable balance between imports and home production seems to be easier to achieve at present; Portugal has already found this balance in its salted cod imports. A meeting was recently convened in London on the initiative of the British Government to try to determine a certain equilibrium between production and imports of white fish. If a similar tendency generalizes, it will certainly help to develop international fisheries trade.

Good quality fish at prices acceptable to the consumer is certainly necessary to improve sales, but it is not enough; another important element is the presentation of the fish. The OEEC Report emphasizes that "... shortage of domestic help has accentuated the growing desire to buy fish in a form easy to prepare, and the retail trade may do well in paying more attention to this factor..."[8]

The sale of fish in fillets is already developed in some European countries and could be made more general. Such presentation makes preparation for cooking easier and enhances the possibility of acceptance by a consumer of a fish which would otherwise be unacceptable

[8]ibid. p. 34.

because of its appearance, even though it might be palatable and of high nutritive value.

This process, for instance, has allowed the German market to give a prominent place to redfish, a species unknown on the same market 25 years ago.

This evolution in the habits of the consumers leads to the question of fish propaganda. It has been observed that many people do not eat fish because they are not accustomed to it and that the nutritive value of fisheries products is very often ignored. The inability of housewives to cook fish in the right way may also prevent them from serving it. This situation justifies fish propaganda campaigns. Methods and means for good fish propaganda have already been developed by many European countries. Good results can be achieved if sufficient financial support is given to the campaign and if it is carried out by thoroughly competent people. Such a campaign should not be premature and should be accompanied by favorable factors like the improvement of quality, lowering of prices, improvement of transport, distribution and sales conditions.

M. Girard

FISH CULTURE AS A MEANS OF CONTROLLING AQUATIC WEEDS IN INLAND WATERS

Introduction

Well-known European and American fish culturists have expressed the opinion that a dense vegetation in ponds has a harmful effect on the capacity of production, irrespective of whether it is surface vegetation or a dense growth of submerged plants. Sentences like: "Fish do not feed on leafy plants to any appropriate degree," may be met in almost every text book on pond fish culture. No fish culturist doubts the usefulness of a fine shore vegetation and nobody wants a water deprived of all vegetable life but, it seems that when aquatic weeds occur in such quantities, large parts of the water surface become covered with plant masses and measures have to be taken for the control of the excessive vegetation.

The superfluous growth of plants often induces biological processes which exercise a noxious influence on the forces in control of the natural conservation of the waters. The covering of the bottom by vegetable remnants, the formation of unproductive deposits of mud, and the shading of the water to a degree whereby plankton production comes to a standstill, are often alleged as unwelcome consequences of excessive aquatic vegetation. Fisheries biologists are not the only workers interested in the control of aquatic weeds. Technicians tell us about

plants making waterways impracticable for traffic, decreasing the water holding capacity of irrigation reservoirs or diminishing the permeability of sand filters. Other complaints refer to the fact that waters with a plant covered surface sometimes produce large quantities of mosquitoes, whilst the value of the waters for recreational purposes becomes increasingly restricted by the occurrence of floating vegetation.

Seen from the point of view of fish culture, surely the submerged plants have their merits too. The organic matter produced contributes largely to the maintenance of the fertility of the waters, and the oxygen, produced by assimilation, helps to maintain the aerobic milieu necessary for a complete disintegration of the organic matter. Since, however, the phytoplanktonic organisms in the water are able to fulfill the same functions, fish culturists and irrigation engineers commonly want to restrict the occurrence of aquatic plants in inland waters to planktonic species and to a cover of soft plants on the bottom of the waters.

Without going too much into systematical details, aquatic plants can be divided into the following groups :

Submerged Plants — those not sprouting above the surface of the water — including *Algae* (Myxophyceae, Chlorophyceae, Conjugatae, Characeae) and the *Myriophyllum, Ceratophyum, Naja Hydrilla, Elodea, Brasenia, Vallisneria, Limnophila, Utricularia, Potamogeton, Ranunculus, Polygonum* and *Sphagnum* species.

Floating Plants — those floating atop the water with roots not reaching the bottom — including *Lemna, Azolla, Hydrocharis, Salvinia, Riccia, Pistia* and *Eichhornia* species.

Emergent Plants — those rooted in the soil with stems and leaves floating or thrusting out of the water — including *Typha, Phragmites, Carex, Scirpus, Cyperus, Acorus, Eleocharis, Limnocharis, Glyceria, Sagittaria, Pontederia, Ludwigia, Persicaria, Nymphaea, Marsilia, Jussiaea, Ipomoea* and *Nasturtium* species.

Control of Aquatic Weeds in Europe and North America

Two years ago a *Summary of Literature on Aquatic Weed Control* (Murray Speirs, 1948), containing a synopsis of the methods at present in use in Europe and North America, was published in *The Canadian Fish Culturist.* The author summarized his conclusion as :

"Several methods are generally available to control particular aquatics. To control emergent aquatics such as cattails, bullrushes and spike rushes, 2,4-D or ammate probably give the most permanent control ; dredging and the use of a flame thrower are effective as temporary controls. To control undesired algae, copper sulphate appears to be the best chemical at present ; chloramine may be equally useful but has not been so thoroughly tested ; for algae coating concrete or wooden walls of fish tanks or reservoirs, D-K-Pruf-21 is suggested.

For pond weeds the most effective control appears to be sodium arsenite, but this chemical must be used with caution where it is likely that the water will be later used for drinking purposes by mammals (including man) ; the benoclors are effective controls where fish and other aquatic animals are unimportant ; nigrosine dye may be used to shade out pond weeds where the black color imparted to the water is not a consideration ; in some waters pond weeds have been controlled by adding enough fertilizer to the water to produce a water bloom which shades out the pond weeds ; this method may have merit where dense growths or algae are considered preferable to growths of pond weeds. Water lilies are particularly resistant to chemical methods of control : persistent cutting is the only method of control which appears to giwe satisfactory results as yet."

This statement sufficiently illustrates the fact that fish culturists in Europe and North America are ready to spend plenty of time and money to control excessive vegetation.

Let us now change the sphere of observation, let us look at a field in fish culture which is often treated in a step-motherly fashion by professional people — inland waters in tropical areas.

Control of Aquatic Weeds in Tropical and Sub-tropical Areas

In cold and temperate climates the winter period causes an almost complete disappearance of aquatic vegetation, but in the tropics vegetable matter is produced the whole year round. Basal metabolism, on the other hand, is stepped up in a warm climate to a degree by which the brevity of the term of life of the individual plant causes a dynamic rhythm in vegetation. Theoretically, every shallow stretch of fertile fresh water in the tropics should become completely filled up by a continually altering mass of plants after a certain amount of time. Actually, this condition often occurs, but many waters can be found which, notwithstanding the presence of sufficient plant nutrients, remain totally or partially free of vegetation. Attributing this condition to a single factor would be over-simplifying the facts, but very often the presence of a large stock of plant feeding is the reason for this very characteristic condition.

A number of exotic fish species are able to use directly coarse vegetable matter as food, and waters densely populated with these species will hardly ever become crowded with weeds. Some examples will illustrate this relationship.

In 1926, dams were constructed in the eastern part of Java for the hoarding of water for irrigation purposes. A few months after filling, the reservoirs (tanks) created in this way showed a dense vegetation of *Ceratophyllum* and *Naja* which reached the surface when water was tapped from the tanks. A serious condition occurred after malaria carrying mosquitoes went to breed in the plant-infected waters. The Irrigation Service tried to get rid of the aquatic vegetation, but even hundreds of laborers could not achieve any success in the struggle

against the quick growing weeds. The Inland Fisheries Service then took over the assignment and stocked the waters with *Puntius javanicus*, a carp-like fish, well-known in Java for its ability to feed on coarse vegetable matter. Not more than eight months were needed to free the tanks, covering a total surface of 284 ha. (700 acres) of all vegetation and, in addition, a fine fishery was built up. The fish spawned in the tanks so that restocking was necessary only when a tank had to be drained for maintenance or other purposes. Fish production amounted to an average of 220 kg. per ha. (196 lbs. per acre) per annum.

Some years later the officers of the Public Water Works in Makassar (Celebes) complained about the occurrence of large quantities of Green Algae (*Chlorophyceae*) in the storage reservoirs, which repeatedly made necessary a revision of the sand and gravel filters. *Puntius javanicus* were shipped from Java to Celebes and some months later the reservoirs were free from algae. From the waterworks *Puntius* escaped to a little river in which they propagated. From there the fish were transplanted, in 1937, to the Tempe Lakes, a group of shallow waters in South Celebes covering, during the wet season, an area of about 20,000 ha. (49,420 acres). Before 1937, these lakes had more or less the habitus of swamps, and *Hydrilla*, *Ceratophyllum*, *Ipomea*, *Sesbania*, and *Potamogeton* were the typical plant species which occurred there. *Puntius* found the stage set ; feeding on the aquatic weeds the yields rose and, in 1948, a yield of 14,000 metric tons of *Puntius* was obtained. Then, the greater part of the vegetation having vanished, plankton feeding species such as *Trichogaster pectoralis* began to compete, and at present the production of these waters is a steady level of about 8,000 metric tons of fish a year.

Another example is also found in Java. For many years fish culturists and hygienists struggled with the problem of the occurrence of *Chlorophyceae* in brackish water ponds. Milkfish, the species generally reared, consumes the thread-like algal filaments only after they have become weak and soft. When the stock of fish does not keep a pond free of algae, it rapidly deteriorates into a breeding place of *Anopheles*, and many villages in Java have become badly infected with malaria, carried by mosquitoes hatched in ponds. In 1946, the systems developed earlier for so-called "hygienic operation" of ponds could be discarded. Experience has shown that *Tilapia mossambica*, a perch-like fish introduced into Java in 1941, is able to keep the ponds clean using the algae as their principal food. In a recently published paper (Hofstede and Botke, 1950), interesting particulars are given on the capacity of this fish to suppress algal growth and to give the ponds the clean surface that hygienists want them to have.

Indonesia is not the only country in the possession of vegetable feeders among the cultivatable species of fish. *Ctenopharyngodon idellus*, the Chinese grass carp, is also famous for its ability to consume a prodigious amount of grass and even leaves and sprigs of heather are easily consumed when given to the fish as food. *Ctenopharyngodon idellus* has lateral dentations on its comb-shaped pharyngeal teeth

which enable it to cut foodstuffs against its dorsal plate so that even coarse matter can be digested. Large quantities of the fry of these fish are shipped every year from Southern China by way of Hong Kong to Thailand, Viet-Nam, Cambodia, Malaya, and even to Ceylon, and they are appreciated everywhere for their rapid growth, culinary qualities and ability to feed on inexpensive foodstuffs.

The rearing of vegetable feeders is an almost classic feature of East Asian fish culture. It is, therefore, very interesting indeed that when, comparatively recently, the culture of fish in ponds was taken in hand in Central Africa, vegetable feeders again came to the foreground. In the Congo, Belgian limnologists began some years ago to investigate the suitability of indigenous fresh-water fishes for cultivation in ponds. In a relatively short time, two species — both belonging to the family *Cichlidae* — were found which almost completely met the demands commonly made upon pond fish. *Tilapia macrochir* and *Tilapia melanopleura* can be spawned in captivity ; they grow rapidly enough to make an annual production of about 2,000 kg. per ha. (1,785 lbs. per acre) possible and they are popular as edible fish. De Bont et al. (1950) give interesting particulars on the nutritional options of these fish. The first mentioned feeds on plankton and epiphytes ; *Tilapia melanopleura*, on the other hand, is a typical plant feeder. After it has reached a length of 10 cm. (4 in.) its food consists exclusively of aquatic plants of which *Hydrilla*, *Chara*, *Sparganium*, *Potamogeton*, *Leersia* and *Lagarosyphon* have been found in great quantities in the intestinal contents. Like *Puntius*, *Tilapia* also take manioc and other soft leaves as food when kept in ponds, but its capacity seems to go even further. This remarkable fish is able to handle banana leaves as well as the coarse leaves of *Carex*, *Typha* and even certain types of *Papyrus*. *Paspalum* species, which in tropical areas so often give shallow waters the appearance of flooded grass land, are consumed without any difficulty. In a recent publication, *Techniques de pisciculture actuellement utilisées au Congo Belge*, A. F. de Bont (1949) gives photographs of typical ponds, cleaned by *Tilapia* of semi-emergent vegetation.

With regard to the control of weeds, the facts mentioned above are gaining importance in the light of measures which have been or will be taken in the near future in various countries.

In South Asia and the Far East, the aquatic weed problem has assumed such dimensions that the Indo-Pacific Fisheries Council resolved to request its member countries to report on experience in the use of herbicides for the control of noxious water plants, whilst a subcommittee was invited to prepare a handbook on the basis of the information assembled. It was the increasing spreading of the water hyacinth (*Eichhornia crassipes*) that motivated those steps, taken on behalf of various agencies interested in the conservation of inland waters.

In Asia, as well as in other regions, dense masses of water hyacinth often cover wide stretches of water, hampering the diffusion of light and air, and stimulating the accumulation of large amounts of vegetable substances on the bottom of the waters. The interception of light

by a dense layer of Eichhornia is of detrimental influence on the conditions of the water. The small amount of oxygen, absorbed from the air, scarcely covers the respiratory demands of living organisms ; whilst, as a result of the decrease of the intensity of light, the photosynthetic liberation of oxygen comes to an almost complete standstill. The continual generation of carbon dioxide, on the other hand, rapidly brings down the pH and this is why waters overgrown with Eichhornia rapidly reach a stage in which fish production becomes very small. Scarcity of oxygen, a low pH, and lack of live food restrict the occurrence of fish to a few species which, like the Labyrinth fishes, can accommodate themselves to the new environmental conditions.

Present knowledge of the feeding habits of cultivatable types of fish does not cover the control of the water hyacinth biologically, but it is possible to eradicate the weed by the use of selective growth substances of which, 2,4-D is most frequently used.

Vaas (1951) reported on his experiments with 2,4-D in Indonesia, which were almost immediately followed by practical application. Seen from a technical point of view, the eradication of Eichhornia in Java was a success ; within a few months a marshy lake in the central part of the island, 1,900 ha. (4,693 acres) in extent, could be freed of water hyacinths by spraying it with a solution, containing 0.16% of 2,4-D, using a coverage of a one liter solution to three square meters of plant covered area.

However, the eradication of the water hyacinth did not come fully up to expectations. The plant masses consisted of various species of weeds, some of which rapidly germinated after they were freed from the strangling clutch of Eichhornia. The large quantity of nutrients brought into the cycle by the progressing decomposition of the hyacinths, explains the luxuriant growth of the remaining plants. Should we thus abstain from using weed killers for the eradication of Eichhornia ? Certainly not. Removal by hand is uneconomical and reinfection may occur rapidly when the entire vegetation is not removed at once. Mechanical removal requires expensive equipment and gives little guarantee against reinfection. So chemical eradication is surely a step in the right direction, but only when it is applied in combination with measures which contribute towards keeping the remaining weeds under control.

The facts about the feeding habits of various species of fish given in the first part of this paper point out that aquatic weeds can serve directly as food for cultivatable fish. It is obvious that a direct conversion of vegetable matter into fish flesh is a more logical attempt to tackle the problem of weed eradication than annihilating the plants by mechanical or chemical means. The transformation of live vegetable matter into edible fish is a very rational way to produce food, since the minute consumption of energy during the process vouches for a higher productivity than attainable in any other form of fish culture. Even when the question of cost is left out of consideration, natural

control of vegetation by herbiverous fish must be given preference above other methods because it gives the best guarantee of continuous improvement.

Conclusions

Although much still has to be learned about the cultivation of plant feeding fish, there has been enough experience gained to make it possible to use them to eradicate certain aquatic weeds in tropical or sub-tropical water systems.

It is suggested that countries wishing to clear their ponds of vegetation first endeavor to find an indigenous species of plant feeding fish, cultivate it to produce the stock and distribute it to the affected waters.

On controlling weeds by means of fish culture, the first point to consider is the feeding habits of the indigenous species of fish suitable for human consumption. Unfortunately, investigations of this nature are often still regarded as superfluous by administrative agencies. Without a certain amount of limnological research no development of inland fisheries is possible and investigating the feeding habits of the cultivatable fish will not only give strength to the work of weed control, but will also lay the basis for all future activities in the field of fish culture. Since the herbivores are always reduced in number by the primary and secondary carnivores in natural fish associations, the likelihood exists that a little-known plant feeding species can be found among local fishes.

If a suitable species is discovered, the next step is to put it under observation on a pond farm and to develop a technique for propagating it under controlled circumstances. Some types of fish spawn in rearing ponds without special preparations, but for others specially constructed ponds, water responding to particular demands, or special treatment of the brood fish, is necessary. It would be beyond the limits of this paper to go into details of the various methods of breeding and rearing of warm water fish. At present, twelve of approximately forty species are known to be cultivatable in ponds and can be spawned in captivity. The rising interest in inland fisheries makes a future increase of the number very probable.

When a survey of indigenous fish does not lead to the detection of cultivatable species, transplantation of exotic fish may be taken into consideration. It is possible that fish with the required qualities may be found in regions with similar climatic conditions.

The facts already mentioned are sufficient proof of the advantages which can sometimes be attained by transplantation of plant feeding fish. This, of course, does not imply that rash importation of foreign species of fish is advocated, but it means the often aired grievances against that their importation "will crowd out our indigenous fish" should be taken for what they are worth. When a reasonable yield can be obtained from plant infected water, a situation which seldom appears, importation of new species should be taken in hand only after

careful consideration of the possible consequences. As a rule, however, plant infected waters in tropical areas show a prevalence of predacious species which scarcely provide for more than subsidiary fishing. The amount of available matter, unused and perishing from decay, proves that the actual capacity of production of the waters is often only partially utilized.

When it is decided to introduce a new fish, construction of one or more pond farms is the next step to be taken. On these farms the fish must be propagated and reared until a sufficient number of half or full grown specimens is available for rough release. Stocking a natural water with fry where predators occur has proved to be a bad policy, even when the fry are kept in protected sites for a time before their release.

The time during which stocking material is reared should be used for experiments in limiting predators. This can be achieved in a relatively simple way by a survey of the fishing methods, applied by the local population, and by stimulating an expanded use of the most effective methods. A choice will have to be made between the various methods in favor of those most efficient for catching predacious fish, the occurrence of which should be restricted. Even the transfer of new methods or handy equipment from other areas is often necessary. By supplying the fishermen with sufficient quantities of fishing gear, for instance, traps or long-lines, intensification of the fishery may often be within reach, whilst the offering of premiums for the catch of large predators will be a means of fostering the fishery of a certain type of fish.

It is not the porpose of this paper to mean that fish culture is a general remedy against plant infection. The writer has tried to point out that the existence of plant feeding fishes opens new possibilities for the control of noxious weeds in tropical and sub-tropical areas, and it is hoped that the facts mentioned in the paper will contribute towards establishing the conviction that tropical fish culture has aspects which are far wider than those of the cultivation of fish in moderate climates.

W.H. Schuster

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Fisheries Division Activities

Preparation for the International Meeting on Fisheries Statistics

FAO member nations and related organizations have been invited to attend a meeting on fisheries statistics to be held under the auspices of FAO in Copenhagen, Denmark, 26-31 May 1952, in co-operation with the host government. The purpose of the meeting is to review methods used in various countries, with an eye to the improvement and rationalization of national and international fisheries statistics on topics such as fish catches, fisheries equipment, and trade.

Several working papers have been completed for the meeting; others are being drafted. It is planned that a total of about 20 papers will be distributed to the participants who are expected to arrive largely from European and North American countries.

After the meeting all papers will be incorporated in a consolidated report to be published by FAO.

Below is a provisional list of the papers which are issued under the main title, "Purpose and Methods in Fisheries Statistics :"

PROVISIONAL LIST OF AUTHORS AND SUBJECTS FOR WORKING PAPERS

(*a*) *The Need for Statistics*

K. Sunnanaa (Norway)	"The Fisheries Administrator's Need for Statistics."
J. le Garrec (France)	"The Fishing Industry's Need for Statistics." (*In French*)
A.W.H. Needler (Canada)	"The Biologist's Need for Statistics."
W.R. Martin (ICNAF)	"Statistical Requirements of the International Commission for the Northwest Atlantic Fisheries (ICNAF)."
Nils Rosén (ICES)	"The Statistical Work of the International Council for the Exploration of the Sea (ICES)."
A.I.C. Jensen (Denmark)	"Fisheries Statistics necessary for Predictions of the Catch and for Determination of the Optimal Catch."
R.J.H. Beverton (United Kingdom)	"Notes on the Statistical Requirements of the North Sea Convention."
A.W. Anderson (United States)	"Statistics on Long-term Trends in Fisheries."

(*b*) *Landings' Statistics*

J.M. Besseteaux (France)	"Economic Statistics in Sea Fisheries—their Present and Future Role." (*In French*)

J. le G. Lacy (United Kingdom) — "Collection of Fishery Statistics, England and Wales."

——— , (Denmark) — "The Reorganization of Denmark's Fisheries Statistics."

Ch. Gilis (Belgium) — "Co-ordination of Statistics to be published in the *FAO Yearbook of Fisheries Statistics.*" (*In French*)

(*c*) *Craft Statistics*

H. Angerman (Norway) — "Craft Registry in Norway and Its Use for Statistics."

G. Meseck (Germany-Fed. Rep.) — "Fishing Fleet Statistics of the Federal Republic of Germany."

M.J. Girard (FAO) — "Present Situation with regard to Statistics on Fishing Craft."

(*d*) *Trade Statistics*

L.P.D. Gertenbach (FAO) — "International Comparability of Statistics on the External Trade in Fisheries Commodities."

P.F. Ericksen (Denmark) — "The Importance of Fisheries Statistics for Trade Agreements and for the Export of Fish."

D.J. van Dijk (Netherlands) — "Statistics in Fish Market Investigations."

Bauer (Germany-Fed. Rep.) — "Statistics on Marketing and Processing of Sea Fish in Western Germany."

(*e*) *Miscellaneous Subjects*

G.M. Gerhardsen (FAO) — "General Notes on Purpose and Methods in Developing Fisheries Statistics."

G.M. Gerhardsen, L.P.D. Gertenbach, (FAO) — "Statistical Treatment of Fish in Food Balance Sheets."

G.M. Gerhardsen, L.P.D. Gertenbach (FAO) — "Notes on Conversion Factors in Fisheries Statistics."

FAO Fish Culture Seminar, Indonesia

FAO and the Government of Indonesia will jointly conduct a seminar on fish culture in Djakarta and Bogor (Java) from 1 May to 15 June 1952. Five Indonesians and ten other students from south and east Asian countries will take part in the school. The seminar, which has developed from recommendations of the Indo-Pacific Fisheries Council, will be provided with facilities by the Government of Indonesia. During the six week course, the students will have the opportunity of becoming acquainted with the biological, technical and economic aspects of the culture of fresh water and brackish water

fish. Lectures, laboratory practice and field excursions will be provided to train the students to undertake development research and extension activities in their own countries.

W.H. Schuster of FAO's Fisheries Division will act as instructor in fresh-water and brackish water fish culture, while experts from Indonesia will be responsible for other specialized subject matters. Dr. K.F. Vaas, Head of the Laboratory of Inland Fisheries, Bogor, will teach limnology ; Dr. J.D.F. Hardenberg, Head of the Laboratory for the Investigation of the Sea, Djakarta, will give lessons an ichthyology ; P. Ch. Veen will lecture on the chemistry of salt and brackish water and A. van der Voort will lecture on soil research.

The greater part of the lessons will be given at Bogor, where use can be made of the facilities of the General Agricultural Research Station and the Laboratory for Inland Fisheries. Brackish water fish culture will be studied in the coastal area, where the students will be housed in the Marine Laboratory at Pasar Ikan.

Release of OEEC Report on Fish Marketing in Europe

The report of the OEEC expert on Fish Marketing in Europe, which was prepared under the supervision of G.M. Gerhardsen of the Fisheries Division of FAO, has now been released by the OEEC in English and French, and is being reviewed in the professional fisheries press. *The Fishing News*, a trade journal, published in the United Kingdom, classifies the Report as "...a magnificent effort, packed with information and — what is far more important — packed with forthright condemnation of malpractice wherever it has been found..."

Notes on this Report are given in the feature article of this issue by M.J. Girard, who assisted G.M. Gerhardsen in the OEEC work and edited the French version.

Advice to Newfoundland Fishing Industry

At the request of the Fisheries Development Committee of the Province of Newfoundland, Canada, Jan-Olof Traung, FAO Naval Architect, spent some three weeks in Newfoundland advising on a fishing boat building program. Traung was impressed with the efficiency of the Newfoundland fishing schooners and his advice to the Development Committee included suggestions for converting the schooners from dory fishing to long-lines, trawling and Danish seining.

En route to Newfoundland, Traung spent a week in Ireland evaluating fishing boat designs and advising on the choice of engines. On his return he spent some time in London, assisting the Pakistan Government in its negotiations for the construction of two fishing research vessels.

Inland Fisheries of Jordan

At the request of the Government of Jordan, W.H. Schuster, FAO Fish Culturist, spent one week in that country in February, 1952, advis-

ing the Government on the development of inland fisheries. Schuster made water and soil tests of selected areas and drafted schemes for the operation of existing ponds and advised on the construction of new ponds. While in Jordan, Schuster worked closely with the officials of the United Nations Relief and Works Agency and made suggestions for the introduction of fish cultural operations in thet Agency's settlement programs.

Expanded Technical Assistance Program

Brazil. Dr. C.J. Bottemanne has completed his reconnaissance survey of Brazilian fisheries and at the end of February was preparing his report at Rome Headquarters.

Ceylon. After a period of illness Alan Glanville has resumed work on mechanization of gear and craft in Ceylon. He has been supplied with various types of experimental motors for fishing craft, as well as an assortment of nets and other gear for use in demonstration purposes.

Chile. The biological survey of the hake fisheries off the coast is progressing under the direction of Dr. Erik Poulsen. Field work has been expedited through the use of a commercial trawling vessel, assigned to the project. Training of counterpart assistants in biological research has been inaugurated. J. Fridthjof is continuing with pilot projects to encourage the increased consumption of fish. Fridthjof's project has been extended for six months at the request of the Government of Chile.

Ecuador. With the approval of the Government of Ecuador, Dr. Schweigger and Dr. Gonzales, experts in the fishery projects in Ecuador, were loaned during January as instructors for the Fisheries Training Center, Valparaiso, Chile. Prior to leaving on his assignment, Dr. Gonzales instructed various people in Ecuador in fish preservation.

Finland. A Draft Agreement is before the Government of Finland providing for a review of fishery administration and research in the country.

Haiti. The *Tilapia* introduced in the experimental ponds by S.Y. Lin have continued to thrive and reproduce. Many thousands of progeny have already resulted from the original stock of brood fish imported from Jamaica — on 24 June 1951, a shipment of 115 *Tilapia* was made by air in covered containers. The introduced carp also continue to grow, but success has not yet been attained in getting them to spawn. At the request of the Government of Haiti, this fish culture project has been extended for one year. A fish nurseryman will be provided to assist in introducing fish culture to private ponds.

India. Preparations are being made to conduct a fisheries study in West Bengal. H. Botke and W. H. Mackenzie, both from the Netherlands, and lately of the government fisheries services

in Indonesia, will be assigned to this project. At the request of the Government of India work will begin during the second week of May. A Draft Agreement providing for fishery projects in other Indian states is before the Government for approval.

Iraq. A Draft Agreement providing for assistance in managing interior fisheries and in the evaluation of a deep sea fishing enterprise at present underway here is before the Government for approval.

Israel. Recruiting is in progress to locate fishery experts for assignment to the various projects in Israel. A biologist has been located to assist in increasing production in fish ponds and in the Sea of Galilee.

Liberia. H. van Pel, who recently completed an FAO assignment in Pakistan, has been selected for the post of fisheries engineer to assist in boat and gear mechanization. He will begin work in Liberia some time in March. Recruitment is in progress to locate an expert for the post of fisheries technologist.

Libya. The survey of the sponge fishery off the coast by Dr. C. Serbetis of Greece is being prepared for submission to the Libyan Government. Dr. Serbetis reports that there are possibilities for increasing sponge production by Arab fishermen, especially in shallow, inshore waters. Possibilities also exist for increasing fish production by local fishermen, perhaps to some 15,000 metric tons annually, by developing a hook and line and long-line fishery using small craft, towed to prolific areas at some distance from shore.

Pakistan. A Draft Agreement is before the Government providing for a survey of fish trade routes in East Pakistan with a view to locating sites for fish harbors and to improving the design of fishing vessels.

Panama. A Draft Agreement is in preparation providing for a study of the fisheries of Panama with a view to developing a program for their management.

Saudi Arabia. The exploratory survey to locate fish resources in the Red Sea off the coast will begin in early October when weather conditions are most favorable. Dr. M.K. El Saby, Chief of the Egyptian Fisheries Department will be in charge. He will be assisted by a practical fisherman with experience in fishing in the Red Sea. The fishing vessel to be used in the survey will be chartered from Port Said.

Somaliland. A survey of pelagic fish resources off northern Italian Somaliland begins early in March. H. Ogilvie, a commercial fisherman from California, is handling the fisheries engineering phases and A. Fraser-Brunner, of the United Kingdom, is serving as fisheries biologist. These experts will conduct the ocean going part of their work from a vessel to be provided by one of the local Italian fishing companies.

Thailand. Dr. S.W. Ling is continuing his evaluation of the inland waters of Thailand to locate areas suitable for the stocking of fish and has already stocked several swamps and canals with adaptable fish raised in hatcheries under his supervision. Training local students in fish culture techniques continues.

Turkey. A Draft Agreement is before the Government providing for fisheries exploratory surveys and the establishment of fisheries enterprises.

Yugoslavia. A Draft Agreement is in preparation to provide one fisheries technologist to assist in improving techniques and methods for canning and curing fish.

Notes on Films

LOCAL FISH SUPPLY. Producer : G.B. Instructional Ltd., Imperial Studios, Elstree Way, Boreham Wood, Herts, England. Distributor : G.B. Equipments Ltd., Mortimer Street, London, W.1. For distribution outside the United Kingdom, special arrangements are made in each case. Technical data : 16 mm., black and white, sound ; 362 feet, 10 minutes running time, commentary and titles in English. Price : 16 mm. black and white print, £ 14.0.0d. Rental in the United Kingdom : 7s 6d. first day.

The film is mainly intended for school use.

The film opens with the unloading of trawlers at the fishing ports. Movement of fresh fish to large cities is shown by an animated railway map of the United Kingdom and shots of trains, etc. Billingsgate in London is taken as a typical fish market. Trucks take the fish from the trains to the market and the trading there is shown. Another diagram reveals the organization of a market itself. Transfer to retail fish shops and how codfish are cut up and prepared as steaks, as well as the cutting and smoking of haddock follow. A further diagram shows the distribution of retail fish shops in a section of London.

M.J.

THE FISHMONGER. Producer : G.B. Instructional Ltd., Imperial Studios, Elstree Way, Boreham Wood, Herts, England. Distributor : G.B. Equipments Ltd., Mortimer Street, London, W.1. For distribution outside the United Kingdom, special arrangements are made in each case. Technical data : 16 mm., black and white, silent, 382 feet, 10 minutes running time, titles in English. Price : 16 mm. black and white print £ 11.0.0d. Rental in the United Kingdom : 5s. 6d. first day.

This film is a popular version of the above-mentioned "Local Fish Supply."

M.J.

NORDSØSILD (North Sea Herrings). Producer : Dansk Kulturfilm, Krystalgade 15 B, Copenhagen K, Denmark. Distributor : Statens Filmcentral, Dahlerupsgade 1, Copenhagen V, Denmark, and the Press Office of the Danish Foreign Office. Technical data : 35 mm. (and 16 mm.) black and white, sound, 326 meters, commentary and titles in Danish. Price : 16 mm., D.Kr. 275.00; 35 mm., D.Kr. 525.00.

The film shows a fishing vessel being made ready off the Skaw and its departure for fishing grounds in the North Sea. One follows radio telephone communications between various fishing vessels and sees how they assist each other in finding the most profitable fishing grounds. Brief shots of the setting and hauling of a herring trawl and salting aboard. Some sequences also show the auctioning of the fish after landing.

M.J.

GRINDEDRAB PAA FAERØERNE (Pilot Whale Capture in the Faroes). Producer : Dansk Kulturfilm, Krystalgade 15 B, Copenhagen K, Denmark. Distributor : Statens Filmcentral, Dahlerupsgade 1, Copenhagen V, Denmark, and the Press Office of the Danish Foreign Office. Technical data : 16 mm., black and white, silent, 98 meters, 9 minutes running time, titles in Danish. Price : 16 mm. print, D. Kr. 150.00.

Produced in colsultation with Heine S. Heinesen. The film shows how pilot whales are caught round the Faroe Islands. Whenever a school is located, boats gather from fishing villages in the vicinity. By noise and splashing of water, the whales are frightened and driven towards a bay. When they are in shallow water, they are killed with spears. As the animals are quite large, they splash around in the water violently ; therefore, the killing is a rather hectic process whereby boats and men are splashed with water and blood. Finally, men go out to fasten lines to the whales, which are then hauled ashore.

The film gives a somewhat disconnected but picturesque description of this rather unusual fishery.

M.J.

THE TRAWL IN ACTION. Producer : Ministry of Agriculture and Fisheries, Fisheries Laboratory, Lowestoft, England. Distributor : George Humphries & Co., Ltd., 71-77 Whitfield Street, Tottenham Court Road, London, W.1, subject to authorization from the producer or Ministry of Agriculture and Fisheries, St. Stephens House, Victoria Embankment, London, S.W.1. Technical data : black and white, silent, 16 mm. : 360 feet ; 35 mm. : 900 feet ; 10 minutes running time ; titles in English. Price : 16 mm. print, £. 2.11.8d ; 35 mm. print, £. 6.17.3d. approximately.

This film was produced by the United Kingdom Ministry of Agriculture and Fisheries Laboratory in Lowestoft, in co-operation with the Underwater Photographic Section of the Admiralty's Research Laboratory in Teddington.

The film commences with some stills showing the equipment used by frogmen and frogmen ready to descend.

The actual cinematographic sections of the film are underwater shots of a trawl under dragging conditions at a depth of 10 fathoms. The text explains the best conditions for such photographs. The pictures show the warp leading down to the trawl and the otter boards moving over the bottom, sending up large clouds of sand. Close-ups of the trawl headline and upper netting, and a view of a frogman moving around in the water, are also shown. It is clearly demonstrated how the meshes of the trawl are wide open during dragging. The ground rope is almost completely obscured by clouds of sand, but is visible sometimes. Various trawl floats are shown. The orthodox spherical floats give an estimated opening of 8 feet of the trawl. Trawl plane floats and the Siamese-twin floats give openings estimated at 10 to 12 feet and 15 feet respectively.

The film is very useful for the professional fisheries worker in showing the actual behavior of the trawl about which little is known.

M.J.

Notes on Publications

FWS 9.2 FISHERIES STATISTICS — NORTH ATLANTIC OCEAN UDC 31 : 639.2 (261)

Rosén, Nils. *Bulletin statistique des pêches maritimes* [Sea Fisheries Statistics], Vol. 32, 1947. International Council for the Exploration of the Sea, (ICES), Copenhagen, Denmark. 39 pp. In English. 1951

Continues a long series of annual summaries of special questionnaires from countries of north-western Europe, members of the ICES . (There are no figures on the Faroe Islands). Gives total landings in weight (round fresh weight in most cases) and value, and details by fishing area for each species. Monthly data on catches are given for some species and countries. A section dealing with number, type and tonnage of fishing vessels reflects data available in various countries. Contains fish nomenclature.

G.M.G.

FWS 9.2 FISHERIES STATISTICS — THE NETHERLANDS UDC 31 : 639.2 (492)

The Netherlands, Central Bureau voor de Statistiek. *Statistiek van de visserij* 1950 [Fisheries Statistics 1950]. W. de Haan N.V., Utrecht, the Netherlands. 47 pp. In Dutch. 1951

Annual statistical survey of the Netherlands' fisheries. Reports briefly on the organization of marine and coastal fisheries statistics; gives a general survey of production in various branches of the industry, and comments on external trade, processing of fisheries commodities, consumption, prices, etc.

Detailed statistical tables give fish landings by month, harbor, kinds of craft and gear, fishing grounds, composition of the fishing fleet, fish prices, etc. In some instances, 1950 data are compared with 1949, and one or two tables compare the 1950 data with 1930 onwards.

L.P.D.G.

FWS 9.7 FISHERIES EDUCATION — NORWAY UDC 37 (481)

Norway. Innstilling fra komiteen for høyere fiskeriundervisning [Report
1951 of the Committe on Higher Fisheries Education]. Department of Fisheries, Bergen, Norway. 17 pp. In Norwegian.

This committ e report for the Norwegian Parliament (Storting) suggests a supplementary education for prospective fisheries workers with a university degree. The proposal calls for joint and specialized courses in fisheries biology, economics and technology in co-operation with existing universities.

G.M.G.

FWS 9.11 OCEAN UDC . 51.46

Scripps Institution of Oceanography. Contributions, 1950. University
1951 of California, La Jolla, California, U.S.A. Illus. In English.

Contains contributions Nos. 435-490 published in sources other than the official *Bulletin* and *Records of Observation* of the Institution. Covers biological and oceanographical subjects.

H.R.,Jr.

FWS 1.016 OCEAN — UNION OF SOUTH AFRICA UDC 551.46 (68.01)

Royal Society of South Africa. Transactions, Vol. 33, Part. 1. Royal
1951 Society of South Africa, University of Cape Town, Rondebosch, Union of South Africa. 151 pp., illus. In English. Price £. 1.13.0d.

Nine technical papers including one on experiments in sea floor photography in South African waters and the first part of another on the ecology of South African estuaries.

H.R.,Jr.

FWS 9.16 FRESH WATER BIOLOGY — BRAZIL UDC 551.48 (81)

Bastos, José Alberto Magalhães. Notas Preliminares do Estudo Limnoló-
1951 gico dos Açudes Riachão e Amanarí [Preliminary notes of the Limnological Study of the Riachão and Amanari Reservations]. *Publicação* No. 149. Serviço de Piscicultura, Departamento de Obras Contra a Sêca, Ministerio de Viação e Obras Publicas, Rio de Janeiro, D.F., Brazil. 31 pp., 40 fig , tables, mimeo. In Portuguese.

Gives results of chemical analyses made on the waters of the two reservoirs during a 12 month period. Oxygen, CO_2 alkalinity, nitrites, chlorides, iron and silica content, were analysed.

H.R., Jr.

FWS 6.3 PLANKTON — BIBLIOGRAPHY UDC 593.1 (01)
582.26 (01)

Panikkar, N.K., et al. A Bibliography of Plankton of the Western
1951 Sector. *Occasional Paper* 51/3. Indo-Pacific Fisheries Council, FAO Regional Office for Asia and the Far East, Maliwan Mansion, Bangkok, Thailand. 16 pp., mimeo. In English.

Prepared by the staff of the Indian Government's Central Marine Fisheries Research Station, which is under the direction of Dr. N.K. Panikkar. Contains approximately 300 references drawn from literature of the world. The first of the eleven sections lists general papers and is followed by nine systematic papers and one on plankton and fisheries. Nearly half the bibliography concerns phytoplankton. Indicates not only that there already exists a useful body of literature on the planktonic biota of this s ctor, but also that there is an appreciable amount of current work in progress.

G.L.K.

FWS 1.8 MOLLUSKS — URUGUAY DUC 594 (899)

Barattini, Luis P. Malacología Uruguaya. Enumeración Sistemática y
1951 Sinoníma de los Muluscos del Uruguay [Mollusks of uruguay. Check-list of the Mollusks of Uruguay]. *Publicacióne Científica* No. 6. Servicio Oceanografico y de Pesca, Montevideo, Uruguay. 179 pp. In Spanish.

A check-list of the terrestrian, fresh-water and marine mollusks of Uruguay, giving the distribution and synonymy of these species.

H.R.,Jr.

FWS 1.042 FISHES — DENMARK UDC 597 (489)

Bruun, Anton Fr., Pfaff, J.R , Løppenthin, Bernt, and Magnus. List
1950 of Danish Vertebrates. Dansk Videnskabs Forlag a/s (Danish Science Press Ltd), Copenhagen, Denmark. 180 pp., 1 map. In English. Price : D.Kr. 10.5

A general survey of the 688 species of Danish vertebrate fauna. Listed are 231 species of fish of which 183 (excluding the anadromous species) are marine. The species of marine vertebrates found in the Skagerrak and the interior waters up to 16° longitude east in the Baltic are included even if they have been found only in Norwegian or Swedish territorial waters.

H.R.,Jr.

FWS 1.015 FISHES — SINGAPORE UDC 597 (595.13)

Kow, Tham Ah. The Food and Feeding Relationships of the
1950 Fishes of the Singapore Straits. Colonial Office, *Fishery Publications*, Vol. 1, No. 1. H.M. Stationery Office, London. 35 pp., 5 fig., 29 tables, 1 appendix. In English. Price : 5s. net.

The results of an investigation of the food and feeding relationships of the fishes of the Singapore Straits, carried on together with the study of the physical, chemical and biological characteristics of their habitat.

H.R., Jr.

FWS 1.016 FISHES — WEST AFRICA UDC 597 (66/675)

Postel, E. *Pêche sur les côtes d'Afrique occidentale, II. Rapport et Note*
1950 *sur quelques poissons de surface de la presqu'île du Cap-Vert.* [Fisheries on the French West African Coast, II. Report and Notes on Some Pelagic Fish of the Cape Verde Peninsula]. Inspection générale de l'élevage, Dakar, French West Africa. 77 pp., illus., maps. In French.

Gives information on the morphology, anatomy and ecology, as well as on the fishing methods of *Euthynnus alletteratus, Orcynopsis unicolor, Cybium tritor, Caranx carangus, Caranx senegallus, Seriola lalandi, Coryphaena hippurus, Lichia amia*, and *Temnodon saltator*.

H.R. Jr.

FWS 1.013 FISHES — URUGUAY UDC 597 (899)

Buen, Fernando de. *El Mar de Solís y su Fauna de Peces, II Parte, La*
1950 *Fauna de Peces del Uruguay* [The Sea of Solis and its Fish Fauna. Part II, The Fish Fauna of Uruguay]. *Publicaciones Cientificas* No. 2, Servicio Oceanografico y de Pesca, Montevideo, Uruguay. 100 pp. In Spanish.

A check list of marine and fresh-water fish of Uruguay giving the distribution, synonymy and common names of some of the species

H.R., Jr.

FWS 1.9 EELS UDC 597.5

Rodríguez Olegario and Alvariño, Angeles. *Anguilas y Angulas Biología, Pesca, y Consumo* [Eels and Young Eels, Biology, Fishing Methods and Consumption]. Subsecretaria de la Marina Mercante, Madrid, Spain. 95 pp., 43 figs. In Spanish.
1951

A study of the migration, geographic distribution, life story, fishing methods and processing of eels, with particular reference to those of Spain.

H.R.,Jr.

FWS 9.6 REFRIGERATION AND REFRIGERATION MACHINERY UDC6 21.67

Griffiths Ezer (Editor). Refrigeration Principles and Practice. George Newnes Ltd. Tower House, Southampton St., Strand. London, W C.2. 580 pp 173 illus., bibl. In English. Price: £. 2.2.Od.
1951

A handbook covering most aspects of the application of refrigeration. Special chapters are devoted to freezing of fish, packing materials for frozen food, construction of cold stores, refrigeration machinery, etc.

M.J.

FWS 1.0147 FISHERIES — GERMANY UDC 639.2 (43)

Germany. Bundesministerium für Ernährung, Landwirtschaft und Forsten. *Jahresbericht über die Deutsche Fischerei 1950* [Annual Report on the German Fisheries 1950]. Verlag Gebr. Mann, Berlin, Aug. 1951. 254 pp. In German.
1951

Compared with the 1949 report, mentioned in *FAO Fisheries Bulletin* Vol. 4, No. 1-2, pp. 55-56, this publication is considerably enlarged, particularly with regard to statistics.

G.M.G.

FWS 9.6 FISHERIES — FRANCE UDC 639.2 (44)

Office scientifique et technique des pêches maritimes. Bulletin d'information et de documentation. Nouvelle Série. [Bulletin of Information and Documentation, New Series], 59 Avenue Raymond Poincaré, Paris 16; mimeo. In French.
1950

Started in 1950, this publication is issued in four series covering different aspects of French fisheries. Series A gives general information; B covers fishing boats, methods and gear, and fisheries biology; C deals with shell fish culture; and D covers fresh fish, biochemistry, canning of fish, cold storage and handling of fisheries products and by-products.

H.R., Jr.

FWS 1.013 FISHERIES INDUSTRIES — PERU UDC 639.2 (85)

Perú, Sociedad Nacional de Industrias del Perú, Comité de Pesca. *Anuario de las Industrias Pesqueras del Perú, Año* 1951. [Yearbook of the Peruvian Fisheries Industry, 1951]. Comité de Pesca de la Sociedad Nacional de Industrias del Perú, Lima, Peru. 82 pp., illus. In Spanish.
1951

The first yearbook of Peruvian fisheries gives general information on new developments in the Peruvian industry. Contains various articles on the technological, economical and biological aspects of the commercial fisheries. It is dedicated to the proposed Latin American Fisheries Council, sponsored by FAO.

H.R., Jr.

FWS 1.017 FISHERIES — NEW ZEALAND UDC 639.2 (931)

New Zealand, Marine Department. Report on Fisheries for the 1951 Year Ended 31st March 1950. Extract from the Annual Report of Marine Department, 1950. Government Printer, Wellington, New Zealand. 38 pp. In English.

In this report statistical tables and text cover the principal features of the New Zealand fishing industry in the calendar year ended 31st December, 1949. Detailed statistical data for landings, methods of fishing, fishing vessels and personnel, external trade, etc. are presented. A special part of the report is devoted to new developments (regulations, administration, research, etc.) in fresh-water fisheries.

J. A.

FWS 1.0148 FISHERIES RESEARCH — SPAIN UDC 639.2.001.5

Spain, Consejo Superior de Investigaciones Cientificas. *Publicaciones* 1951 *del Instituto de Biología Aplicada* (Publications of the Institute of Applied Biology), Vol. 9. Universidad de Barcelona, Barcelona, Spain. 269 pp., illus. In Spanish, with English summaries.

Fifteen contributions, mainly studies of different species of fish, crustaceans, plankton and oceanography.

H.R., Jr.

FWS 9.1 FISHERIES RESEARCH, BIOLOGICAL — EASTERN PACIFIC OCEAN UDC 639.2.001.5(266)

Pacific Marine Fisheries Commission. Third Annual Report for the 1951 year 1950. The Board of Commissioners, Pacific Marine Fisheries Commission, Portland, Oregon, U.S.A. 24 pp. In English.

Reports on the work of the Commission which is sponsored by the states of Washington, Oregon and California, and research carried on by the state and federal agencies which co-operate with the Commission. Covers research on ocean salmon, albacore, pilchard, sablefish and on the other trawl fishery.

H.R., Jr.

FWS 9.1 FISHERIES RESEARCH, BIOLOGICAL — GERMANY UDC 639.2.001.5 (43)

Deutschen Wissenschaftlichen Kommission für Meeresforschung 1951 [Transactions of the German commission for the investigation of the sea] Vol. 12, Part 3. E. Schweizerbartsche Buchhandlung, Stuttgart, W. Germany. 429 pp., illus., tables, bibl. In German.

Contains a contribution of the late Professor Ernst Hentschel on results achieved in Baltic Sea (Bornholmbecken) plankton investigations by the practical application of the plankton sampling method he developed in 1938. In continuation of the series of reports on biological statistical investigations of German high sea fisheries, a paper by J. Lundbeck gives a survey of the individual weight and weight/length relationship of species important to German fisheries. The result of 54,000 weight and length determinations of 38 species of fishes are given in 46 tables.

W.H.S.

FWS 1.0149 FISHERIES — ADRIATIC SEA — BIBLIOGRAPHY UDC 639.2:01 (262.3)

Morovic, Dinko. *Prilog Bibliografiji Jadranskog Ribarstva* [SUPPLEMENT TO THE BIBLIOGRAPHY OF ADRIATIC FISHERIES]. Series 1. Institut za Oceanografiju i Ribarstvo u Splitu fnr Jugoslavija, Split, Yugoslavia. 142 pp. In Croat, with Italian summary.
1950

Lists books and articles on sea fisheries published in Yugoslavia 1864-1949. All material listed can be found in the Split, Municipal Library, the University Library in Zagreb and in the library of the Institute of Oceanography and Fisheries in Split.

A.M.S.J.

FWS 2.1122 FISHING METHODS AND GEAR — LINE FISHING — TROLLING UDC 639.2.081.43

Pacific Marine Fisheries Commission. BULLETIN 2. Portland, Oregon, U.S.A. 101 pp., illus., tables. In English.
1951

Four studies of the salmon troll fisheries of California, Oregon, Washington State and Canada.

H.R., Jr.

FWS 9.1 FRESH WATER BIOLOGY — U.S.A. UDC 639.21 (73)

Wohlschlag, D.E., and Gerking, S.D. INVESTIGATIONS OF INDIANA LAKES AND STREAMS. Indiana Department of Conservation. Division of Fish and Game and the Department of Zoology, Indiana University, Indianapolis, Indiana, U.S.A., Vol. 3, Nos. 9-11. 434 pp., illus., bibl., tables. In English.
1950

Contains three papers dealing with the ecological conditions and stocks of fish in Indiana lakes. The first paper reports success in producing plant growth in a marl lake by the addition of peat. In the second, an experiment of removal of carp from a lake is described and in the third, a description is given of the fish population and the fisheries in a deep marl lake with a surface area of 143 hectares (353 acres) and a shallow and narrow shore line.

W.H.S.

FWS 9.1 FRESH WATER BIOLOGY — U.S.A. UDC 639.21 (73)

The American Fisheries Society. TRANSACTIONS, 1950. Colorado Co-operative Fisheries Research Unit, Colorado A and M College, Fort Collins, Colorado, U.S.A. 407 pp., illus., tables. In English. Price U.S.$4.00.
1951

Report of the Eightieth Annual Meeting held in Memphis, Tennessee, 1-3 September 1950. Contains 28 biological and technical papers on inland fisheries. There are eight contributions on problems in the management of inland waters, thirteen on biological research, and seven on pond fish culture Important topics include fish harvesting on Tennessee Valley Authority reservoirs, sampling of fish populations in rivers, management of lake fisheries, production statistics and costs of fish hatcheries, stocking of ponds with large mouth bass, sun-fish and channel catfish. A noteworthy article : "Consideration for an International Approach to Taxonomy of Marine Fish." The business section contains the report of standing committees and officers to the Meeting.

W.H.S

FWS 9.16 FISH CULTURE — INDONESIA UDC 639.3 (595)

Schuster, W. H. *Pemeliharaan Ikan Dalam Perempangan di Djawa*
1950 [Fish Culture in Salt Water Ponds in Java] Publication No. 2 of the series *Inland Fisheries* of the Ministry of Agriculture and Fisheries of the Government of Indonesia. Translated by R. Rustami Djajadiredja. 245 pp., illus. In Malay, with English summaries.

A Malayan edition of Schuster's book, reviewed in *FAO Fisheries Bulletin* Vol. 3, No. 5, p. 126.

H.R., Jr.

FWS 9.16 FISH CULTURE — HATCHERIES UDC 639 304

Demoll, Reinhard, and Steinmann, Paul. *Praxis der Aufsucht von Forellen-*
1949 *besatzmaterial* [Rearing of Trout Fry for Stocking]. E. Schweizerbartsche Verlagsbuchhandlung, Stuttgart, Germany. 98 pp., illus. In German.

A revised and enlarged edition of Steinmann's book on the rearing of trout fry for stocking purposes. Covers all aspects of hatching eggs and alevins of rainbow and brook trout, nursing fry and rearing fingerlings. Deals with diseases and parasites affecting young trout in hatcheries and describes how to fight infections.

W.H.S.

FWS 9.15 WATER POLLUTION UDC 639.331.5

Halme, Erkki. *Die Abwasserfrage der Zellstoffwerke im Lichte einiger*
1950 *Fischereitoxologischer Versuche* [The Problem of Polluted Water Discharges by Cellulose Factories in the Light of Fish Toxologic Experiments]. *Annales Zoologici Societatis Zoologicae Botanicae Fennicae "Vanamo"* Helsinki, Finland. Vol. 13, No. 7. 118 pp., 17 tables. In German, with Finnish summary.

A review of toxologic investigations on the pollution of waters by cellulose factories. In a number of experiments eggs and larvae of various common fresh-water fishes were used to determine the toxic effect of polluted waters. A description is given of methods which lead to a decrease of the injurious effects of the discharges containing sulphate, lye and resinous substances.

W.H.S.

FWS 9.16 SHELLFISH CULTURE — MOLLUSKS UDC 639.4 (52)
— JAPAN

Cahn, A.R. Clam Culture in Japan. *Report* No. 146. Natural
1951 Resources Section, General Headquarters, Supreme Commander for the Allied Powers, Tokyo, Japan. 103 pp., 38 figs., tables, 1 map. In English.

Gives the methods of culture and harvesting of the 10 most important clam species together with other information on distribution, living conditions, reproduction and development, followed by a list of 13 other species almost as important, but not cultivated. Names of 61 other species occasionally used as food are also given, thus completing the list of edible clams of Japan.

H.R., Jr.

FWS 2.6 FISH TRADE — ITALY UDC 658.6 (45)

Associazione Nazionale Importatori Prodotti della Pesca Conservati. *Re-*
1950 *lazione dell'attività svolta dall'Associazione nell'anno* 1949 [REPORT ON THE ACTIVITY OF THE NATIONAL ASSOCIATION OF IMPORTERS OF PRESERVED FISHERIES PRODUCTS, 1949]. Rome, Italy. 103 pp. In Italian.

A detailed account of the activity of the Association in 1949. Special chapters are devoted to the analysis of international trade policies for fisheries products, including liberalization of trade, countries and fisheries commodities for which Italy has special import agreements, international trade conventions on fisheries products, import duties on preserved fish, etc. Gives import statistics for selected years and certain fisheries commodities by countries of origin, etc.

J. A.

FWS 9.2 FISH TRADE — U.S.A. UDC 658.6/8 (73)

Russell Ralph. *Quarterly Outlook for Marketing Fishery Products, October-*
1952 *December* 1951. Fishery Leaflet 336k. United States Department of the Interior, Fish and Wildlife Service, Washington 25, D.C., U.S.A., January 1952. 24 pp. In English. Free.

This pamphlet, the twelfth in a series issued quarterly, reviews marketing problems of the fisheries industry on the basis of the general economic conditions in the United States and forecasts marketing developments for certain fisheries products.

G.M.G.

FWS 0.6 FOOD TECHNOLOGY UDC 664

Jacobs, M. B. (Editor). *The Chemistry and Technology of Food Products.*
1951 Vols. I and II, 2nd edit. Inter-science Publishers, Inc., 250 Fifth Avenue, New York, and 2a, Southampton Row, London, W.C.1 832 pp., xxvi+935 pp., illus. In English.

The second completely revised and augmented edition of Volumes I and II of this three volume work. Volume I contains 19 chapters covering the physical chemistry of foods, the carbohydrates, lipids, proteins and amino acids of food products, enzymes, vitamins, vitagens and hormones mineral matters and other inorganic food adjuncts, coloring matters in foods, digestion and fate of foodstuffs, food spoilage and food poisoning unit operations and processes (weighing and measuring, storage, processing), food supervision and grading, instruments in the food plant, food machines, washing and sanitation, insect, fungus and domestic rodent control. Each chapter has a selected bibliography.

Volume II includes a chapter on fish, shellfish and crustaceans and is written by M.E. Stansby. A short description of the commercial fisheries of the United States is followed by sections on the composition of fish and fish oils, the spoilage of fish, the principles of freezing and cold storage of fish, preserved fish, fish by-products, and a short annotated bibliography of fisheries technology.

E.H.

WS 9.6 FISHERY PRODUCTS — GERMANY UDC 664.95 (43)

Petermann, Fritz. *Taschenbuch für Fischwerker* [POCKETBOOK FOR
1951 FISHERIES WORKERS]. Nordwestdeutscher Fachverlag, Hamburg, Germany. 192 pp., illus. In German. Price DM. 8.40.

Contains recipes, directions for manufacture, etc., for the various products commonly made in Germany.

M.J.

FWS 1.015 FISH PRESERVATION — PHILIPPINE REPUBLIC UDC 664.95 (914)

Avery, A.C. FISH PROCESSING HANDBOOK FOR THE PHILIPPINES. 1950 *Research Report* 26. United States Department of the Interior, Fish and Wildlife Service, Washington 25, D.C, U.S.A. 149 pp., 219 illus., bibl. In English. Price U.S.$0.50.

Lists a number of recipes for various special Philippine fish dishes. Gives information on drying, smoking, freezing and canning, particularly home canning, of fisheries products. Published to promote fish preservation and fish distribution in the Philippine Islands, the book will undoubtedly be of value in promoting the use of fisheries products in other Far Eastern or tropical countries, as many of the methods suggested require very little equipment.

M.J.

FWS 0.6 FISHERIES RESEARCH, TECHNOLOGICAL — UNION OF SOUTH AFRICA UDC 664.95.001.5 (68)

Fishing Industry Research Institute. FOURTH ANNUAL REPORT OF 1951 THE DIRECTOR, 1 APRIL 1950 TO 31 MARCH 1951. Cape Town, Union of South Africa. 16 pp. In English.

Contains brief resumés of the result of research works in canning, chilling, smoking, salting and drying of codfish, salting of pilchard, fish and rock lobster meal, net preservatives, etc. Also gives general information about the activities of the Institute.

M.J.

FWS 3.5 SALTED COD, HAKE, ETC. UDC 664.956.2

Hawes and Company (London) Ltd. REVIEW OF SALTED FISH PRO-1951 DUCTION AND THE EUROPEAN MARKETS, 1950-51 SEASON. Imperial House, London E.C.2. 62 pp. In English.

Follows the same line as the previous Review referred to in *FAO Fisheries Bulletin* Vol. 4, No. 1-2, p. 64.

G.M.G.

FWS 0.8 FACTORIES — MAINTENANCE AND REPAIR UDC 69

Copenhagen, W.J., and Whitby, L. REPORT ON CORROSION PROBLEMS 1951 OF THE WEST CAPE COAST FISH MEAL AND CANNING FACTORIES. Fishing Industry Research Institute, Portswood Road, Cape Town, Union of South Africa. 24 pp., mimeo. In English.

A survey of corrosion problems in 14 fish plants, particularly in canneries (exhaust boxes, retort baskets and steam pipes), and fish meal plants (external surfaces of cookers and oil presses). Detailed recommendations are given for preparation of new steel structures for painting, and of old structures for repainting, for choice of suitable primers and finishing paints and of rust-resistant alloys.

E.H.